

Novel ionenes with allyl pendant groups

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Summary

Novel ionenes with allyl pendant groups have been synthesized by condensation of N,N'- bisallylpiperazine with organic dihalides such as 1,4-dichlorobutane, 1,6-dibromohexane and 1,4-dichloromethylbenzene. The polymers are readily soluble in water and have low molecular weights. The structure of the ionenes has been identified by spectroscopic techniques. The concentrated aqueous solutions of the resulting ionenes can be crosslinked by t-butylhydroperoxide as a radical initiator to give transparent hydrogels. The ionenes also act as an crosslinking agent in copolymerization with high concentrations of acrylic acid in the presence of $K_2S_2O_8$ as a radical initiator in water at 65°C.

Introduction

Ionenes are ionic polymers containing onium groups (mostly quarternary ammonium groups) in the backbone. One of the most common way of preparing ionenes is Menshutkin reaction of ditertiary amines with organic dihalides. In this reaction, no polymer is formed when the number of carbon atoms between two amino groups is less than 3, due to cyclization (1).

The properties of ionenes depends strictly on the charge density. Ionenes with high charge density demonstrate strong ionic interactions in aqueous solutions. Whereas ionenes derived from dihalides with long alkyl chains have lower charge density and show many similarities to organic polymers (2).

Ionenes like other polyelectrolytes have found potential applications in flocculation (3) and preparation of symplex membranes for pervaporization (4). Principally all the ionenes are expected to have common usages of other cationic polyelectrolytes.

Recently, Wang et al synthesized the ionenes by reacting α,ω -dialkanediamines with α,ω -dibromoalkanes based on Menshutkin reaction(5). They found that by means of

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